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STUDENT OUTLINE

DEPARTMENT OF THE ARMY TECHNICAL PUBLICATIONS

LEARNING OBJECTIVES:

1. TERMINAL LEARNING OBJECTIVES:

a. Given an organizational maintenance manual for a specific model tactical motor vehicle and scenario identifying required corrective maintenance, use the maintenance manual to locate instructions required to perform a specific corrective maintenance procedure, per information contained in the reference. (6.2.3)

b. Given an organizational maintenance repair parts and special tools list for a specific model tactical motor vehicle, and scenario identifying a requirement for repair parts, use the repair parts and special tools list to locate information necessary to order the required repair parts, per information contained in the reference. (6.2.4)

c. Given a lubrication order/instruction for a specific model tactical motor vehicle and scenario that describes a specific lubrication requirement, use the lubrication order/instruction to locate instructions required to complete the specific lubrication requirement, per information contained in the reference. (6.2.5)

2. ENABLING LEARNING OBJECTIVES:

a. Given an organizational maintenance manual for a specific model tactical motor vehicle and scenario identifying required corrective maintenance, per information contained in the reference, locate information pertaining to:

(1) required equipment condition for universal joint replacement, (6.2.3a)

(2) safety procedures that must be followed during fuel level sending unit replacement, and (6.2.3b)

(3) procedures used to replace the parking brake. (6.2.3c)

b. Given an organizational maintenance repair parts and special tools list for a specific model tactical motor vehicle and scenario identifying a requirement for repair parts, per information contained in the reference, extract the:

(1) national stock number for a brake pedal and (6.2.4a)

(2) item number for brake shoes. (6.2.4b)

c. Given a lubrication order/instruction for a specific model tactical motor vehicle and scenario that describes a specific lubrication requirement, per information contained in the reference, locate the:

(1) lubricant capacity for the front differential, (6.2.5a)

(2) abbreviation for transmission lubricant, and (6.2.5b)

(3) lubrication interval for front wheel bearings. (6.2.5c)

OUTLINE

1. AN OVERVIEW OF THE ARMY TECHNICAL PUBLICATION SYSTEM

a. The Marine Corps has common interest and application in numerous subjects and equipment with one or more of the other military services. In many cases, such subjects and equipment items are supported by a full range of publications, of which all or part are adequate for Marine Corps use. It is contrary to current Department of Defense policy for one service to prepare and publish separate or particular publications on equipment supplied by another service. Therefore, the Marine Corps is required to use technical publications prepared by other military services to the maximum extent possible.

b. Department of the Army publications are the principle source of information pertaining to operation and maintenance of tactical motor vehicles used by the Marine Corps. Most motor vehicles used by the Marine Corps are also used by the Army and they (the Army) have already developed publications to support the equipment. The Department of Defense has directed that these publications be made available to the Marine Corps.

c. There are basically two types of Army publications used by the Marine Corps to aid in maintenance of our equipment. These two types of publications are technical manuals and lubrication orders.

(1) Technical manuals are broken down into two categories: equipment type and general type.

(a) Equipment type manuals normally apply to a specific item of equipment or a series of equipment. These manuals provide information on procedures to be applied to correctly use and maintain the item of equipment they are pertinent to. Examples of specific types of information contained in equipment type manuals are:

1 table of preventive maintenance checks and services,

2 systems maintenance instructions and

3 troubleshooting procedures.

(b) General type manuals contain information that is applicable to more than one item of equipment. One of the Department of the Army general type technical manuals that a mechanic will encounter is TM 9-8000, Principles of Automotive Mechanics.

1 As the name implies, this manual deals with general principles and theories of automotive mechanics.

2 Information pertaining to characteristics and principles of operation of internal combustion engines, suspension systems, power transmission systems, and automotive electrical systems is contained in that general type equipment manual.

(2) Lubrication orders.

(a) Lubrication orders contain information on authorized lubricants, lubrication intervals, work measurement standards for each lubrication interval, and mandatory lubrication instructions for all equipment issued that requires lubrication by maintenance personnel.

(b) Lubrication orders are identified by the same numbering system as equipment technical manuals, including the two-digit category of maintenance numbers, except they are prefaced by LO or LI instead of TM.

2. THE NUMBERING SYSTEMS USED TO IDENTIFY EQUIPMENT TYPE TECHNICAL PUBLICATIONS

a. The Department of the Army Equipment Type Technical Publications Numbering System.

(1) All Army equipment type technical publications are assigned a number to identify the literature to a specific item of equipment. These

numbers are prefixed by letters, and in the case of a repair parts manual, are suffixed by letters.

(2) The identifier for all equipment type manuals begins with the Letters "TM." The letters "TM" identify the publication as a technical manual.

(3) Identifying base number "9" is assigned to all technical publications that apply to ordnance equipment. The number "9" is used to identify ordnance materiel within the U. S. Army, and tactical vehicles are classified as ordnance items.

(4) The four number grouping that follows the numeral "9" represents the Federal supply classification group and class that is assigned to the equipment covered by the publication.

(5) Federal supply classification, which is referred to as the FSC, for most tactical motor vehicles and trailers is 2320. Test equipment is assigned FSC 4910. An FSC listing is contained in DOD Directive 4130.2 (H2-1, Cataloging Handbook).

(6) The three digit number that follows the FSC designation is the sequence number assigned to distinguish manuals prepared on equipment covered by the particular series and the same FCS. For example; M939 Series vehicles are assigned sequence number 272.

(7) The two numerals that follow the sequence number, designate the echelon of maintenance authorized to use that publication. The reason for the two digit number is that one manual may apply to one or more echelons of maintenance. In a case such as this, the first number indicates the lowest echelon, the second number indicates the highest echelon.

(a) A technical manual that contains the echelon designator "20" applies to second echelon maintenance level only.

(b) Any Army technical manual that has an echelon designator of "20" is referred to as an "Organizational Maintenance Manual."

(8) The next digit, if used, is the volume designator. Volume designators are used when the amount of information within the technical manual exceeds the number of pages that can be bound in one volume. Some equipment technical manuals will not be published in volumes.

(a) In general, more technically complex vehicles will be supported by equipment technical manuals published in more than one volume.

(b) Volume designators are assigned in numerical sequence starting with the number one (1).

(9) The last digit within the equipment technical manual numbering system is known as a part designator. Again, a part designator may not be used.

(a) Part designators are used when information that would normally go in a particular volume of an equipment technical manual is so extensive that printed information exceeds the page limitations for a single volume.

(b) Equipment technical manual part designators are also assigned in numerical sequence starting with the number one (1).

(10) When the echelon designator is followed by a letter suffix "P" this indicates that the manual is a repair parts and special tools list for a particular item of equipment that is used by the echelon or echelons of maintenance indicated. For example, if the echelon designator is 20, and the 20 is followed by a "P", the 20P would indicate that the manual is a second echelon repair parts and special tools list.

(11) The identifying number for Department of the Army lubrication orders start with the alpha prefix of "LO". Ordnance number, FSC number and sequence numbers are the same as used for technical manuals. The echelon designator would be "12", indicating first and second echelon since it is the responsibility of first and second echelon to lubricate the vehicle.

b. The Marine Corps numbering system for Department of the Army Equipment Type Technical Publications.

(1) In the past, the Marine Corps used the same numbering system as the Army to identify Department of the Army equipment type technical publications. However, vehicles recently adopted by the Marine Corps have technical manuals that are assigned a different type of number.

(a) The first element of the technical manual number is TM (Technical Manual) or LI (Lubrication Instruction) depending on the type of publication it is. Notice that the Marine Corps uses LI rather than LO.

(b) The Federal stock classification number will be the same as that assigned by the Department of the Army; 2320 will be assigned to trucks and trailers.

(c) The next element of the number is the maintenance echelon designator. There is no number specifically assigned to identify a particular series of vehicles in the number that the Marine Corps assigns to a Department of the Army equipment type technical manual.

(d) The last number in the Marine Corps numbering system is simply a sequence or publication number and it has no specific meaning with respect to any particular vehicle.

(2) As you can see, the Marine Corps method of numbering the publications is more simple but it does not include a specific vehicle type identifying number. Both numbering systems are being used at this time so you must be able to interpret either.

3. PROCEDURES USED BY THE DEPARTMENT OF THE ARMY AND MARINE CORPS TO IDENTIFY AND PUBLISH CHANGES TO TECHNICAL PUBLICATIONS AND THE IMPORTANCE OF MAINTAINING UP-TO-DATE TECHNICAL PUBLICATIONS

a. Changes to Department of the Army publications that are made by the Army are published as numbered changes in numerical sequence.

b. Changes pertaining to technical publications that are necessary to cause Department of the Army technical publications to be aligned with Marine Corps policy are published as letter coded changes by the Marine Corps.

c. Regardless of who publishes a change, it is imperative that changes are made to the manuals that you have on hand. Oftentimes, engineering changes are made to equipment systems that you are not aware of; these changes may dictate new maintenance procedures. If your technical publications contain the latest changes you will have the necessary information to correctly maintain assigned equipment at all times.

4. DEPARTMENT OF THE ARMY ORGANIZATIONAL MAINTENANCE MANUALS

a. Technical manuals, or TM's as they are referred to, are the source of all technical information pertaining to the maintenance and repair of tactical motor transport vehicles.

(1) While a student in this school, and later as a working mechanic, you will be encouraged and required to use TM's as a reference to guide your working activities. The ability to use technical manuals correctly is essential for anyone who is involved with maintenance and repair of technically complex automotive equipment that the Marine Corps has.

(2) Most TM's now in use are published in the same basic format, regardless of the equipment or maintenance echelon to which they apply.

b. All the guidance, instructions, and procedures pertaining to the maintenance and repair of an item of equipment are contained in the TM's that apply to that vehicle.

c. Table of Contents

(1) Army technical manuals, like many commercial publications, include a table of contents to indicate to the user exactly where in the publication specific topics are covered.

(2) Learning to use the table of contents correctly will serve two purposes:

(a) First, you will learn how to locate information quickly when you need it.

(b) Secondly, you will acquire a good understanding of the various types of information that are contained in the TM.

1 The table of contents in TM 9-2320-272-20-1 not only gives the location of its chapters and sections, but will also indicate chapters and sections that are located in volume 2.

2 In the left hand column, Arabic numerals are used to identify each chapter contained in the publication. Roman numerals are used to identify sections that are included in each chapter.

3 The center column of the table of contents provides the noun title of each chapter and section.

4 The column on the right side of the table of contents indicates page numbers where these chapters and sections can be located.

d. Preventive Maintenance Checks and Services

(1) To make sure that vehicles are maintained in a state of readiness, a comprehensive program of preventive maintenance is prescribed for each vehicle.

(2) PM checks and services that are required to be accomplished at the second echelon maintenance level are identified in the organizational maintenance manual.

(3) The Preventive Maintenance Checks and Service Table is used as a guide by the organizational maintenance mechanic to perform prescribed scheduled preventive maintenance in proper sequence. This table contains the following columns:

(a) The first column is the Item Number. Preventive maintenance checks and services should be accomplished in item number sequence.

(b) The next column is the Interval column. This column is sub-divided into three columns with letter codes representing specific intervals. When you are performing annual PMCS, you must also perform all PMCS designated as semiannual "S" checks and services. Likewise, if you are doing a biennial service, you must accomplish all services required at semiannual "S" and annual "A" intervals. That only makes sense, if you must do something covering six months, six months have elapsed since you performed that check on the semiannual level.

(c) A black dot (bullet) will appear in the appropriate interval column to indicate at what interval a certain procedure should be accomplished. Notice on the transparency that you are viewing that two black dots appear in the "S" column beside item number 1. The dots indicate to the mechanic that he/she must, on a semiannual basis; (a.) Notice if the starter makes unusual noises and (b.) Notice if the starter engages smoothly and turns the engine with normal cranking speed.

(d) The next column is Item To Be Inspected column. This column will have names of the items to be inspected during accomplishment of scheduled preventive maintenance checks and services.

(e) The last column is the Procedures column. Procedures for inspecting the item of equipment will be listed in alphabetical sequence starting with the letter "a".

e. Electrical Systems Troubleshooting

(1) This section provides information that will help you diagnose and correct malfunctions in the electrical system of the vehicle.

(2) Because of its complexity, the electrical system is divided into functional systems with the beginning page of each system listed beside it.

(3) Each malfunction symptom given for an individual component or system is followed by the step(s) you should take to determine the cause of the malfunction and corrective action you must take to remedy the problem.

(4) Listed under the malfunction is the test or inspection to be performed, and steps that are used to perform those tests and inspections properly. Test 1 will tell you to check batteries for overheating. Listed below are steps to take to perform this test correctly.

(5) In addition to test procedures, information is provided on interpretation of test results and what corrective action is required to solve the problem.

f. Engine System Maintenance

(1) This chapter provides information pertaining to maintenance of the engine and systems that are associated with the engine. The chapter is broken down into sections; each section covers a specific area of engine or engine systems maintenance.

(2) To locate information you need, look at the section titles. When you find the subject you are interested in, read across to the beginning page number for that section. For example, if you need information on the engine you can see that would commence on page 3-1.

(3) The first page in the section that pertains to the cooling system contains a maintenance task summary. The maintenance task summary provides task paragraph and page number for various tasks covered within the section.

(4) As you can see, the necessary information to guide you in accomplishment of various maintenance tasks you are responsible for is in the book. To summarize:

(a) use the table of contents to determine the beginning page for the type of information you need, and

(b) use the beginning page in the chapter or section you were referred to by the table of contents to determine the location of specific procedures prescribed for the task you are required to accomplish.

(5) Now, let's take a closer look at a specific maintenance procedure.

(a) Notice the type of information that is provided on page 3-146. The information includes:

1 models of the vehicle that the instructions apply to

2 parts, test equipment, special tools, and personnel required,

3 a description of the condition the vehicle should be in prior to accomplishing the task and any special environmental conditions that are required, and

4 general safety instructions.

(b) Following the presentation of information just outlined, you will see the specific step-by-step instructions for the task at hand.

g. Maintenance Allocation Chart

(1) The Maintenance Allocation Chart designates the echelon of maintenance that is authorized to perform various maintenance functions on components identified by the MAC. The maintenance functions are:

(a) inspect, test, service,

(b) adjust, aline, calibrate,

(c) install, replace, repair, overhaul and rebuild.

(2) Allocation of maintenance operations is made on the basis of time, tools and skills normally available to the various echelons of maintenance.

(3) The Maintenance Allocation Chart is divided into two sections.

(a) Section I contains an introduction to the MAC and instructions pertaining to its use.

(b) Section II provides the following specific maintenance allocation related information.

1 Column one (1) Group Number. The purpose of the group number is to identify components, subassemblies and assemblies with the next higher assembly.

2 Column two (2) Component/Assembly. Column two lists the noun names of the components, subassemblies and assemblies on which maintenance is authorized.

3 Column three (3) Maintenance Functions. Lists various maintenance functions to be performed.

4 Column four (4) Maintenance Category. This column is subdivided into five additional columns. The subcolumn wherein the work time measurement appears for a specific task indicates the lowest maintenance category that is authorized to perform that function.

5 Column five (5) Tools and Equipment. This column is used to specify, by code, those tools and test equipment items required to perform the designated function.

6 Column six (6) Remarks. Any additional information about maintenance function will be listed in this column.

h. Equipment technical manuals contain additional appendices that you should be aware of. Due to time limitations we will not cover them in

detail. I encourage you to become familiar with the appendices on your own time. Additional appendices and their purposes are as follows:

(1) Appendix C is normally blank. It is merely a reference to TM 9-2320-272-20P, Repair Parts Manual.

(2) Appendix D also is normally blank. It refers the user to TM 9-2320-272-10 for a listing of expendable supplies and material.

(3) Appendix E provides instructions for the local manufacture of certain repair parts.

(4) Appendix F provides general torque specifications. Any specific torque specifications listed in the chapters on vehicle maintenance take precedence over these general torque specifications.

(5) Appendix G contains schematic and wiring diagrams. You will have a separate class on wiring diagrams.

5. ORGANIZATIONAL MAINTENANCE REPAIR PARTS

a. Repair parts authorized for various echelons of maintenance are cataloged in manuals.

b. These manuals are known as Repair Parts and Special Tools List, and their identifying number will always end with the letter "P" unless they are contained in more than one volume; then it may end as P-1 and P-2, or P/1 and P/2.

c. A "P" manual is published for each 20, 34, and 35 series technical manual that applies to a specific item of equipment. These manuals identify repair parts and special tools that are available at each echelon.

d. Table of Contents.

(1) The table of contents in the repair parts lists serves the same purpose as the table of contents within the equipment technical manual. It provides the location of information contained in the manual.

(2) The table of contents is broken down into four sections:

(a) Section I Introduction. This section provides instructions for using the parts manual and provides a definition of different codes used in the repair parts list.

(b) Section II Repair Parts List. This section provides the necessary information to order a repair part.

(c) Section III Special Tool List. Section III provides a list of tools needed to perform a specific maintenance task.

(d) Section IV NSN/Part No. Index. Section IV provides a cross reference list of National stock numbers and manufacturer's part numbers.

(3) These sections are further broken down into columns and they are as follows:

(a) Column one (1) Group Number. This column provides group number assigned to a specific major component or system and their subassemblies.

(b) Column two (2) Component Name. This column provides the noun name of those components listed within the manual.

(c) Column three (3) Page Number. Column three provides the beginning page number for the information pertaining to each component listed within the manual.

(d) Column four (4) Illustration Figure Number. Column four provides the figure number of the illustrations of the components listed within the manual.

e. Section II Columnar Arranged Data for the Repair Parts List.

(1) The repair parts list is divided into eight columns with each column containing necessary information for a mechanic to order a repair part.

(2) These columns are:

(a) Column one (1) Illustration. This column is subdivided as follows:

1 Figure number indicates the figure number of the illustration on which the item is shown.

2 Item number is used to identify items shown in the illustration.

(b) Column two (2) SMR Code. The acronym SMR stands for source, maintenance and recoverability code. The SMR code has five alpha characters,

and each character provides different information concerning the requisitioning, maintenance, and disposition of repair part. Codes within the SMR will vary depending on the repair part that is needed. The five digits within the SMR code are broken down into the following:

1 Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second position of the SMR code.

2 Maintenance codes are assigned to indicate the levels of maintenance authorized to use and repair support items.

a The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace and use the support item.

b The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair.

3 Recoverability codes are assigned to support items to indicate disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code.

(c) Column three (3) National Stock Number. Indicates the National stock number assigned to the item to identify it within the supply system. The number is also used to requisition the item from supply.

(d) Column four (4) Part Number. This number indicates the primary number used by the manufacturer that controls the design and characteristics of the item.

(e) Column five (5) Federal Supply Code for Manufacturer (FSCM). The FSCM is used to identify the manufacturer, distributor, or Government agency responsible for the item.

(f) Column six (6) Description. Indicates the Federal item name and if required, a minimum description to identify the item.

1 Usable On Codes are provided in the description column. Repair parts manuals normally apply to a series of vehicles rather than a specific vehicle. All parts listed in a manual are not used on each of the vehicles within a vehicle series. For that reason, repair parts are identified to a particular vehicle by a "Usable On Code."

a If no information appears under the description, the listed part is applicable to all models.

b If one or more codes are listed in the Usable On Code column, the codes that are indicated will identify specific models that the part can be used on.

2 A chart that indicates what codes are used to identify specific models within the series is provided in the Introduction, Section I, paragraph 4, Special Information, TM 9-2320-272-20P.

(g) Column seven (7) Unit of Measure. Indicates the standard or basic quantity of the listed item used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation. (EXAMPLE: ea, se, pr, in.)

(h) Column eight (8) Quantity Incorporated in Unit. Indicates the quantity of the item used in the item shown on the illustration figure. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable.

f. Section III, Special Tools List

(1) The special tools list is provided in each repair parts manual. It will list those special tools needed to perform a specific task that are not included in the general mechanics tool box.

(2) The special tools list is presented in the same format as the repair parts list, except within the description column. The description column includes the purpose for which each of the tools is used.

6. ORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST FOR M-998 SERIES VEHICLES, TM 2320-20P/8

a. TM 2320-20P/8, like other parts manuals, lists the repair parts, special tools, Test, Measurement, and Diagnostic Equipment (TMDE), and other support equipment required for operation and performance of organizational maintenance on M998 Series Vehicles. The manual has four basic parts.

(1) The introduction contains general information concerning use of the technical manual, pertinent references, and a detailed key that explains abbreviations and codes used in Section II of the repair parts list.

(2) Section II contains a list of repair parts authorized for use in performance of second echelon maintenance. The parts list is grouped into functional groups same as the MAC. The functional groups and nomenclature are also listed in the Table of Contents. Figures are also included to make part identification easier.

(3) Section III, Special Tools List. The Special Tools List identifies special tools that are authorized for use by organizational maintenance mechanics. Each of the special tools will be covered later in another section.

(4) Section IV, National Stock Number and Part Number Index. The National Stock Number Index lists all parts and materials in the technical manual that are ordered by National Stock Numbers or part numbers. The NSN's and part numbers are cross referenced to the figure and item number where they appear in Sections II and III or the repair parts list.

7. DEPARTMENT OF THE ARMY LUBRICATION ORDER

a. The lubrication order provides information required to properly lubricate the hundreds of moving parts within our equipment. There is a lubrication order published to cover every item of motor transport equipment used in the Marine Corps. The lubrication order may consist of one or more protective coated cards, depending on the different models of vehicles in the series.

b. AOAP is a program of preventive maintenance whereby potentially costly damage to major vehicle components is discovered before such damage occurs.

(1) Oil analysis evaluates used oil and other fluids to determine both their condition and that of the mechanical systems they lubricate.

(2) This is done by Army lab technicians who analyze samples sent to them by maintenance units. Laboratory services are provided at no cost to Marine Corps units.

(3) Oil analysis lab findings are returned to the maintenance unit along with the lab's recommendations.

(4) The maintenance unit can then act on this information by locating and repairing the problem before the problem causes major damage to the component.

(5) Lab reports can also inform maintenance units that the oil sample submitted is okay, and that the wearmetals suspended in the oil sample are normal.

(6) In such cases, the recommendation would be to leave the oil as is. This differs from hard-time service interval policy wherein oil is changed regardless of its condition after so many miles, hours of operation, or calendar months.

c. Each lubrication order contains a Key, which provides the meaning of abbreviations and codes that are utilized throughout the Lubrication Order. The Key is broken down into these columns:

(1) The lubricants column provides abbreviations for the lubricants as well as the noun name of the lubricants used in motor transport equipment. For example; OE/HDO is the abbreviation for Lubricating Oil, Internal Combustion Engine and GO is the abbreviation for Lubricating Oil, Gear Multipurpose.

(2) The expected temperature column provides temperature ranges and lubricant that should be used when operating in that temperature range.

(3) The intervals column is composed of a series of letter and number symbols and definition of those symbols. These symbols are used throughout the lubrication order to advise the mechanic of how often an area or component should be lubricated.

d. Diagram Portion of the Lubrication Order

(1) Within the lubrication order there is a drawing of the undercarriage of the M939 Series vehicle, beside the drawing is a list of components that require lubrication.

(2) Beside each component listed will be the code that identifies the lubricant that is required to lubricate the component and prescribed lubrication interval.

(3) A line is drawn from the component to specific area on the drawing where the component is located. A broken line indicates that the same component is located on each side of the vehicle.

(4) Beneath the listed components, in parenthesis, will be additional information concerning lubrication of the components. That information may refer you to one of the "NOTES" that are listed toward the back of the lubrication order.

(5) These "NOTES" in the lubrication order are very important, they will provide in-depth information pertaining to lubrication of a particular component.

STUDENT REFERENCES:

TM 9-2320-272-20-1
TM 9-2320-272-20-2
TM 9-2320-272-20-P
TM 9-2320-280-20-1

TM 9-2320-280-20-2
TM 9-2320-280-20-3
TM 9-2320-280-20-P
LO 9-2320-272-12
LO 9-2320-280-12